OFFICE OF THE SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

ELECTRICAL SUBSTATION SUSTAINMENT BASRAH, IRAQ

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SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

January 10, 2007

MEMORANDUM FOR DIRECTOR, IRAQ RECONSTRUCTION MANAGEMENT OFFICE
COMMANDING GENERAL, GULF REGION DIVISION,U.S. ARMY CORPS OF ENGINEERS

SUBJECT: Report on Electrical Substation Sustainment, Basrah Iraq (Report Numbers SIGIR PA-06-082, 083, 084, 085, and 086)

Based on data collected for our July 2006 Quarterly Report to Congress, we estimate that approximately 3,600 construction projects will soon be transferred to the Government of Iraq. This massive addition to its infrastructure will encumber the Government of Iraq with a critical management challenge that, if not met, will seriously impact the improvements intended by the reconstruction program.

Because the timeframe for transitioning construction projects is growing short, the Office of the Special Inspector General for Iraq Reconstruction is conducting a series of assessments to determine the condition of completed projects subsequent to their transition to the Government of Iraq and to determine whether the projects are likely to remain operational.

We are providing this report for your information and use. It addresses construction work performed on five electrical substations in Basrah, Iraq, to determine if the projects are likely to remain operational after their transition to the Government of Iraq. These assessments were made to provide you and other interested parties with real-time information on relief and reconstruction projects in order to enable appropriate action to be taken, if warranted.

The Commanding General, Gulf Region Division of the U.S. Army Corps of Engineers concurred with the conclusions and recommendations contained in a draft of this report and implemented corrective actions as appropriate. As a result, comments on this final report are not required.

We appreciate the courtesies extended to our staff. If you have any questions please contact Mr. Brian Flynn at brian.flynn@sigir.mil or at 914-360-0607. For public or congressional queries concerning this report, please contact SIGIR Congressional and Public Affairs at publicaffairs@sigir.mil or at (703) 428-1100.

Stuart W. Bowen, Jr.
Inspector General

Special Inspector General for Iraq Reconstruction

SIGIR PA-06-082, 083, 084, 085, and 086 January 10, 2007

Electrical Substation Sustainment
Basrah, Iraq

Synopsis

Introduction. Because the timeframe for transitioning Iraq Relief and Reconstruction Fund projects is growing short, the Inspections Directorate of the Office of the Special Inspector General for Iraq Reconstruction is assessing transitioned projects to determine if they are likely to remain operational after transition from the United States Government to the Government of Iraq.

This report addresses our assessments of five electrical distribution substations in Basrah that were transitioned to the Government of Iraq in September 2005. The substations were designed to convert high voltage transmission electricity to low voltage electricity and feed it through distribution lines to support local electrical demands.

We conducted this project assessment in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer/inspector and an auditor/inspector.

Project Assessment Objectives. This report is being made to provide real-time project information to interested parties in order to enable timely and appropriate action, when warranted. Our primary objective was to determine whether the projects are operating at the capacity stated in the original contract or task order objective. To address this objective, we determined whether:

1. Any significant deterioration occurred after the projects were transferred to the Government of Iraq;
2. Government of Iraq personnel currently managing and operating the projects have sufficient capacity to operate the facilities;
3. Operating manuals, drawings, and spare parts were delivered to the projects and are being used in conjunction with a preventive maintenance program;
4. Inputs and outputs are consistent with the project objectives; and
5. Any post transition issues were identified and resolved.

Five electrical distribution substations were completed in Basrah in September 2005 and transitioned to the Southern Distribution Company, which reports to the Iraqi Minister of Electricity . The Office of the Special Inspector General for Iraq Reconstruction performed construction assessments of all five substations in July 2005 and found the construction quality adequate and consistent with contract requirements. However, we noted in our report that none of the five substations were energized because incoming transmission lines and outgoing distribution lines were not connected. The Project and Contracting Office[1] informed us that plans to energize the substations were underway. A ten million dollar transmission feeder contract funded with U.S. Government Iraq Relief

[1] The Project and Contracting Office was transferred to the U.S. Army Corps of Engineers Gulf Region Division on December 5, 2006.

and Reconstruction Funds had been awarded to Al Faden Construction Company on April 30, 2005. The distribution feeders were the responsibility of the Iraqi Ministry of Electricity.

At the time of this second assessment, we were informed that transmission and distribution lines were connected to four of the five substations. The transmission lines to the fifth substation at Shut Al Arab were being routed, but had not yet been completed. We physically observed two of the five substations on October 19, 2006, but security conditions prevented physical observation of the other three at that time. However, through representations made by the resident engineer of the South District of the Gulf Region Division of the U.S. Army Corps of Engineers and Iraqi Southern Distribution Company representatives and a review of existing documentation and analysis of satellite imagery of the unobserved substations, we believe that none of the unobserved substations have suffered any significant deterioration since they were transferred to the Ministry of Electricity. Two of the three unobserved substations appear to be operating and the third is waiting for the transmission line connection before it can be energized.

Conclusions: Based on our observations of the two substations, discussions with responsible Gulf Region South, Southern Distribution Company, and contractor officials, and our review of pertinent documents, we concluded that:

1. The facilities were secured and in good repair with no significant deterioration from the time of the first assessment. Four of the five substations were operational while the fifth was waiting completion of the incoming transmission line connection.
2. The substation operations appeared to be staffed by personnel with adequate skills to manage and operate them. However, the formal training provided by the subcontractor to ten Iraqi's appears to have provided no value to the substation operations because none of the Iraqis selected by the Ministry of Electricity were assigned to operations or management positions in the Southern Distribution Company.
3. Spare parts, drawings, and operating manuals were provided as required by the contract. However, confusion over the official acceptance process appears to have caused spare parts to be left in unopened boxes next to at least one substation for over one year. Neither the contractor nor the Gulf Region South Resident Engineer was notified by Southern Distribution Company personnel that the spare parts boxes had not been opened.
4. Although the substations were capable of distributing power to the grid at the time of the second assessment, they were operating at only 36% capacity partially because of insufficient input from upstream transmission substations and partially because of excess switching capability designed into the substations to meet long term demand. The substations should achieve their stated objective when transmission lines are connected to the Shut Al Arab substation and transmission capacity is increased to provide adequate power to energize distribution feeders to meet local demand.
5. Protective relays used to manage power surges in the distribution feeders may not be robust enough for the current environment. The absence of replacement relays required cannibalization from non-energized lines. If left unresolved, degradation in distribution could diminish the power supply to the Basrah area.

Recommendations. We recommended that the Gulf Region Division-Electric Sector Program Office of the U.S. Army Corps of Engineers:

1. Continue actions to connect the transmission lines to the Shut Al Arab substation.
2. Execute a memorandum of understanding with the Minister of Electricity that would require assigning formally trained Iraqi's to specific positions that directly benefit the project. Absent a formal agreement, the Ministry of Electricity should be required to pay the training costs.
3. Modify the project transfer process to insure that there is no misunderstanding or confusion over responsibility and delivery procedures for spare parts, drawings and operating manuals.
4. Review the frequency and cause of the protection relay failures to determine if they are systemic and/or design deficiencies. Based on their analysis, the Gulf Region Division-Electric Sector should work with the Ministry of Electricity to take appropriate action to remedy any premature relay failures.

Management Comments. The Commanding General, Gulf Region Division of the U.S. Army Corps of Engineers concurred with the conclusions and recommendations contained in a draft of this report and informed us that:

1. The Shut Al Arab substation was energized during the week of 26 November 2006.
2. Future operation and maintenance training is to be conducted on site and Gulf Region Division-Electric Sector will request that appropriate Ministry of Electricity staff attend the training.
3. Transfer procedures will be modified to ensure that all spare parts are unpacked and identified to the local substation operators when they transfer the facilities to the Ministry of Electricity.
4. Gulf Region Division-Electric Sector is conducting a technical review to identify the cause of the protection relay failures. Upon completing the review, the Gulf Region Division-Electric Sector will develop and pursue the appropriate course of action to correct any premature relay failures.

Evaluation of Management Comments. The management comments provided by the Commanding General, Gulf Region Division are fully responsive to our recommendations. As a result, comments on this final report are not required.

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Introduction

Objective of the Project Assessments

The objective of these assessments was to provide real-time project information to interested parties in order to enable timely and appropriate action, when warranted. Our primary objective was to determine whether the projects are operating at the capacity stated in the original contract or task order objective. To address this objective, we determined whether:

1. Any significant deterioration occurred after the projects were transferred to the Government of Iraq (GoI);
2. GoI personnel currently managing and operating the projects have sufficient capacity to operate the facilities;
3. Operating manuals, drawings and spare parts were delivered to the projects and are being used in conjunction with a preventive maintenance program;
4. Inputs and outputs are consistent with the project objectives and
5. Any post transition issues were identified and resolved.

Background

Perini Management and Construction (PMC) completed five 33/11 kilovolt (kV) electrical substations in the Basrah area in 2005 under Contract W914NS-04-D-0011, Task Order (TO) 0002/ED017, dated May 1, 2004. The objective for the distribution substation project is to convert high voltage (33 kV) transmission electricity to lower voltage (11 kV) distribution electricity. The TO scope of work included the following major tasks:

- Construct substation building
- Construct perimeter fencing, gates, exterior lighting and guardhouse
- Furnish and install one 33 kilovolt (kV) switchgear
- Furnish and install one 11 kV switchgear
- Furnish and install two 33 to 11 kV transformers
- Furnish and install two 11 to .4 kV auxiliary transformers
- Furnish and install the grounding system
- Complete commissioning of the substation

The five substations were transferred to GRS on September 21, 2005 who immediately transferred them to the SDC. Total costs and commissioning dates for each substation are summarized below:

Substation	Date Commissioned	Total Cost
Al Seraji	September 15, 2005	$ 5,717,727
Shut Al Arab	Not Commissioned	5,724.335
Al Hakimia	September 20,2005	5,677,575
Al Kaffat	September 19, 2005	5,438,408
Hamdan	September 8, 2005	5,718,727
		$ 28,276,772

A Special Inspector General for Iraq Reconstruction (SIGIR) inspection team assessed all five substations between July 29 and 30, 2005 and reported the completed projects should meet and be consistent with original task order objectives. No issues with the quality of the construction and compliance with contract specifications were identified in the report. However, the assessment team noted the facilities could not operate until high voltage feeder lines to the facilities and distribution lines to end users from the facilities were installed. While an Iraq Relief and Reconstruction Fund (IRRF) funded project was underway to complete the high voltage feeder connections to the substations, the team could not identify plans to install distribution lines from the facilities to the residences/end users. As a result, the value and benefit of the substations could not be realized until end user distribution systems were connected. The team recommended that the management agencies determine whether or when end user distribution systems would be connected. The Project and Contracting Office (PCO) responded that the distribution feeder connections were the responsibility of the Iraqi Minister of Electricity (ME).

Subsequent to the first SIGIR assessments, four substations were connected to both transmission and distribution lines. The Shut Al Arab substation, the fifth substation, was not energized at the time of the second assessment because transmission lines were still being routed from the transmission substation. The following schedule summarizes the operating status of the substations at the time of our subsequent assessment:

Usage Summary

Station	Capacity (Mega Watts)	% Used	Output (Mega Watts)
Al Seraji	25	25%	6.25
Al Hakamiya	50	30%	15.00
Al Hamdan	50	70%	35.00
Al Kaffat	50	50%	25.00
Shut Al Arab	50	0	0
	225		81.25
	Total % used		**36%**

SIGIR inspectors physically observed the Al Hamdan and Al Seraji substations on October 19, 2006; however, security conditions prevented physical observation of the Al Hakamiya, Al Kaffat and Shut Al Arab substations at that time.

Current Site Assessment

1. Post Turnover Deterioration Assessment

On 19 October 2006, SIGIR performed on-site assessments of the Al Hamdan and Al Seraji substations in Basrah, Iraq. The objective was to determine if the substations' switch gear, 33/11 kV transformers and two auxiliary transformers were operating. We also observed whether the perimeter security walls, buildings and other construction suffered any deterioration since the projects were transferred to Iraqi Southern Distribution Company (SDC) of the Ministry of Electricity in September 2005.

The facilities were operated by technicians and secured by on-site guards who controlled access through the main control gate. The guards were provided by the SDC.

Our site assessment validated that both the Al Seraji and Al Hamdan substations were connected to the power grid and were both operating. The Al Seraji substation had full transmission power connected to the 33/11 kV transformer but only two of the thirteen distribution feeders were energized. SDC engineers stated that the other eleven distribution feeders were not energized because transmission power was not sufficient to operate all thirteen distribution feeders. The Al Hamdan substation had transmission power to only one 33/11 kV transformer, which provided power to energize five of the thirteen distribution feeders. The second transmission line was not energized because an upstream substation was undergoing maintenance.

Site Photo 1 is a panel display showing the closed circuit that is energizing a distribution circuit.

Site Photo 1. Switch panel display illustrating the closed distribution circuit

Each completed substation included new construction of a building to house the 33 kV and 11 kV switchgear and associated monitoring and control equipment. Requirements included office space; a bathroom facility; heating, ventilating and air conditioning system (HVAC); a fire alarm, internal lighting, and a septic system. The prior on-site assessments verified the construction of the facilities was complete and consistent with the contract and design requirements.

The current sustaining assessment of the Al Seraji and Al Hamdan substations showed that the substation buildings, guardhouses, and perimeter walls remained in good repair. Each substation was secured by security guards and two substation operators, who were present at the time of our visit. Site Photo 2 illustrates the condition of the exterior perimeter of the Al Hamdan substation at the time of our visit. Site Photo 3 illustrates the condition of the interior perimeter walls and transformers at the Al Seraji substation.

Site Photo 2. Al Hamdan substation perimeter walls

Site Photo 3. Al Seraji substation view of internal walls

Switchgear Installation

The contract and design required installing 33 kV and 11 kV switchgear in the newly constructed substation buildings. The prior on-site assessment verified the installation of the switchgear; however, it had not yet been energized. The current site assessment validated that the Al Hamdan 11 kV switchgear was operating and providing power to five of the thirteen distribution feeders. The Al Seraji switchgear was also operating and providing power to two of the thirteen distribution feeders. Site Photos 4 through 7 show no significant change in the switchgear condition between the first and second assessments.

Site Photo4. Al Hamdan substation distribution 11 kV switchgear panels at the time of the initial assessment

Site Photo 5. Al Hamdan substation distribution 11 kV switchgear panels at the time of the second assessment

Site Photo 6. Al Seraji substation distribution 11 kV switchgear panels at the time of the initial assessment

Site Photo 7. Al Seraji substation distribution 11 kV switchgear panels at the time of the second assessment

Transformer Installations

The contract required installing two 33 kV to 11 kV transformers onto concrete pads separated by fire walls. The first on-site assessment verified the two transformers

were installed on concrete pads with firewalls. The current assessment confirmed that the transformers remained in good repair and three of the four were operational. The fourth transformer, located at Al Hamdan was connected to the transmission feeder but was not operating because of maintenance being performed at the upstream transmission substation. Site Photos 8 through 11 shows no significant change in the transformers' condition between the first and second assessments.

Site Photo 8. Al Hamdan 33/11 kV transformer at the first assessment

Site Photo 9. Al Hamdan 33/11kV transformer at the second assessment

Site Photo10. Al Seraji 33/11 kV transformer at the first assessment

Site Photo 11. Al Seraji 33/11kV transformer at the second assessment

2. Capacity Operational Personnel

The substations are operated by technicians who distribute electrical loads by switching circuit breakers when directed by the SDC Basrah Central office. The technicians appear to be adequately skilled to perform their operating responsibilities. Also, based on discussions with key managers, the SDC Basra Central Office staff appears capable to manage and operate the substations.

Formal classroom training on switchboards and transformers was provided by the subcontractor that constructed the buildings and installed the equipment. We were informed that the Director General of the Iraqi Ministry of Electricity (MOE) selected the ten Iraqi trainees who traveled to the subcontractor's facilities in Italy. From discussions with the SDC Distribution management team, we learned that none of the Iraqis who attended the training were assigned to support the Basrah distribution section. Although the SDC appears to be capable of managing and operating the substations, the training offered by the subcontractor would most likely have been more valuable had it been provided to the personnel directly involved in operating the substations. The PCO correctly delegated the responsibility for selection of Iraqis to attend subcontractor provided training to the MOE. However, as demonstrated by the fact that none of the Iraqis who attended the training were assigned to work in the Basrah distribution section, the MOE does not appear to have selected the appropriate candidates to attend the training.

3. Operating manuals, drawings, and spare parts

The contractor delivered manuals, drawings, and spare parts required by the contract to each substation. We observed two unopened wooden boxes on the sidewalk perimeter at the Al Seraji substation building during our site visit. During a follow-up discussion, we learned that these boxes probably contained the spare parts delivered by the contractor. The SDC officials responsible for operating the substation said the spare parts are not officially delivered until they are opened and the contents inventoried in the presence of a contractor or government representative. The GRS resident engineer was unaware that the boxes were not opened and agreed to work with the MOE to open them, observe the contents and secure them in the SDC warehouse. Site Photo 12 shows the boxes thought to contain the spare parts delivered to the Al Seraji substation.

Site photo 12. Boxes thought to contain the spare parts delivered to the Al Seraji substation

SDC officials informed us that maintenance and operating manuals delivered by the contractor were located in the Basrah Central Office. The SDC uses a central maintenance team that travels to the substations to perform preventive maintenance and to troubleshoot and repair problems. They noted that locating the manuals and drawings

in a centralized location provides a secure and efficient environment for maintaining the manuals.

The contractor stated that the operating manuals were prepared in English. Arabic versions were not provided at the direction of the SDC to save money on the project. Our discussions with the SDC officials validated that MOE operation and maintenance (O&M) personnel were competent in reading and speaking English. The 33/11 kV substation operators notify the O&M personnel whenever maintenance is needed. Therefore, publishing the O&M manuals in English is adequate.

4. Inputs and outputs are consistent with the project objectives

Each substation is designed to reduce 33 kV from two transmission lines to 11 kV and distribute power to the grid through feeder lines. At the time of our site visit, the Al Hamdan substation was receiving 33 kV from one transmission line and distributing 11 kV through five of the thirteen available feeders. The operating engineer informed us the reduced input was caused by a down transmission substation that could not feed the second transmission line connected to Al Hamdan. The Al Seraji substation was receiving 33kV from both transmission feeders and distributing 11kV to two of thirteen distribution lines. The SDC Distribution Engineer said that the reduced distribution output was caused by insufficient power from the transmission substations that feed the distribution substation.

The SDC Distribution Engineer noted that both generation and transmission are not currently sufficient to provide adequate power to meet demand. Although four of the five substations are energized, they will not operate to their full capacity until sufficient transmission and generation capacity is available to energize all of the distribution lines.

5. Post transition issues

The substations were delivered to the PCO on September 21, 2005, who immediately transferred them to the SDC.

Protective Relay Problems

During the assessment, SDC engineers provided a list of concerns about the substations that they previously addressed to the contractor during construction. Of the fourteen items listed, the SDC Engineers emphasized that failures of protective relays used in the distribution feeders are the most severe problem. They believed the relays were not able to withstand the 140^{o} temperatures experienced in southern Iraq. They noted that replacement relays were not included as spare parts and are being replaced with relays cannibalized from inactive feeders. The SDC officials noted that when they brought the matter to the equipment contractor's attention, they were advised to take the matter up with the part manufacturer while the relays were still under warranty.

We discussed the relay failures with Iraq Reconstruction Management Office (IRMO) engineers who indicated that the relays should be able to cope with higher local temperatures and significant voltage fluctuations from the Iraqi power grid.

The contractor said they received the list while the construction was underway but their contractual obligation prevented them from taking unilateral action to change the design. They provided the list to the PCO requesting direction but received no reply. At our request, the contractor researched the failures and indicated a probable cause could be a software failure that might be resolved by simply reloading the program. The contractor noted that protective relays maintenance was included in the formal training provided by the subcontractor and the SDC should have the capacity to troubleshoot the problem.

We also discussed the failures with Gulf Region Division's Electric Sector Program Office (GRD-E) program management personnel who indicated that post delivery problems with complex construction such as substations are frequent and generally resolved through the warranty process. However, warranties are frequently voided because operating procedures used by Iraqis do not conform to procedures prescribed by the manufacturers. For example, the substations are designed to reduce and distribute voltage constantly through a centrally managed system. Circuit breakers in the switching gear are designed to protect downstream circuits from power overloads by opening the circuit when amperage anomalies occur. The Iraqis are using the circuit breakers to manage distribution from the substations by cycling them on to energize particular feeders. Because circuit breakers are not designed to cycle on and off numerous times, the way they are being used could have warranty implications on the equipment.

The problem with the substations is symptomatic of the operating and management culture in Iraq where sophisticated operating procedures and preventive maintenance activities are limited. The consequences of this culture are shorter than necessary useful asset lives and higher than necessary operating costs. Providing sophisticated assets to the current management culture requires a longer term transition program to further develop management, administrative, and technical skills that can insure sufficient management of the assets.

The Gulf region South (GRS) Commander noted that lists of this nature are often provided by the Iraqi ministries. The Commander said that if construction and equipment are consistent with contract specifications, there is little they can do to address the matter beyond advising the MOE to pursue a warranty claim.

Conclusions

Based on our observations of the two substations, discussions with responsible GRS, SDC and contractor officials, and our review of pertinent documents and satellite imagery of the project sites, we concluded that:

1. The facilities were secured and in good repair with no significant deterioration from the time of the first assessment. Four of the five substations were operational while the fifth was waiting completion of the incoming transmission line connection.

2. The substation operations appeared to be staffed by personnel with adequate skills to manage and operate them. However, the formal training provided by the subcontractor to ten Iraqi's appears to have provided no value to the substation operations because none of the Iraqis selected by the ME were assigned to operating or management positions in the SDC.
3. Spare parts, drawings, and operating manuals were provided as required by the contract. However, confusion over the official acceptance process appears to have caused spare parts to be left in unopened boxes next to at least one substation for over one year. Neither the contractor nor the GRS Resident Engineer was notified by SDC that the spare parts boxes had not been opened.
4. Although the substations were capable of distributing power to the grid at the time of the second assessment, they were operating at 36% capacity partly because of insufficient input from upstream transmission substations and partly because of excess switching capability designed for the substations to meet long term demand. The substations should achieve their stated objective when transmission lines are connected to the Shut Al Arab substation and transmission capacity is increased to provide adequate power to energize distribution feeders to meet local demand.
5. Protective relays used to manage power surges in the distribution feeders may not be robust enough for the current environment. The absence of replacement relays is requiring cannibalization from non-energized lines. If left unresolved, degradation in distribution could diminish the power supply to the Basrah area.

Recommendations

We recommend that the Gulf Region Division-Electric Sector Program Office (GRD-E) of the U.S. Army Corps of Engineers:

1. Continue actions to connect the transmission lines to the Shut Al Arab substation.
2. Execute a memorandum of understanding with the Minister of Electricity that would require assigning Iraqi's who receive formal training to specific positions that directly benefit the project. Absent a formal agreement, the Minister of Electricity should be required to pay the training costs.
3. Modify the project transfer process to insure there is no misunderstanding or confusion over responsibility and delivery procedures for spare parts, drawings, and operating manuals.
4. Review the frequency and cause of the protection relay failures to determine if they are systemic and/or design deficiencies. Based on their analysis, the GRD-E should work with the Minister of Electricity to take appropriate action to remedy any premature relay failures.

Management Comments

The Commanding General, Gulf Region Division of the U.S. Army Corps of Engineers concurred with the conclusions and recommendations contained in a draft of this report and informed us that:

5. The Shut Al Arab substation was energized during the week of 26 November 2006.
6. Future operation and maintenance training is to be conducted on site and Gulf Region Division-Electric Sector will request that appropriate Ministry of Electricity staff attend the training.
7. Transfer procedures will be modified to ensure that all spare parts are unpacked and identified to the local substation operators when they transfer the facilities to the Ministry of Electricity.
8. Gulf Region Division-Electric Sector is conducting a technical review to identify the cause of the protection relay failures. Upon completing the review, the Gulf Region Division-Electric Sector will develop and pursue the appropriate course of action to correct any premature relay failures.

Evaluation of Management Comments

The management comments provided by the Commanding General, Gulf Region Division are fully responsive to our recommendations. As a result, comments on this final report are not required.

Appendix A. Scope and Methodology

SIGIR performed this project sustainment inspection on October 19, 2006, in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer/inspector and an auditor/inspector.

In performing this Project Sustainment Inspection we:

- Reviewed contract documentation to include the Contract, Contract Modifications, Contract documentation, and Statement of Work;
- Reviewed the Turnover Documents (e.g., Contractor transmittal documents, Spare Part List, etc.);
- Interviewed representatives from the U.S. Army Corps of Engineers, Government of Iraq (GoI) Ministry of Electricity (ME) Headquarters Southern Distribution Company, Perini Management and Construction (PMC) and the Gulf Region Division-Electric Sector Program Management Office and reviewed satellite imagery of the unobserved substations; and
- Conducted on-site inspections at the Al Hamdan and Al Seraji 33/11 kV Electrical Substations in Basrah, Iraq.

Appendix B. Acronyms

GoI	Government of Iraq
GRD-E	USACE Gulf Region Division - Electric Sector Program Office
GRS	South District of the USACE Gulf Region Division
HVAC	Heating, Ventilating and Air Conditioning
IRMO	Iraq Reconstruction Management Office
IRRF	Iraq Relief and Reconstruction Fund
IRMO	Iraq Reconstruction Management Office
kV	kilovolts
ME	Iraq Minister of Electricity
MOE	Iraqi Ministry of Electricity
O&M	Operation and Maintenance
PMC	Perini Management & Construction, Division of Perini, Inc.
PCO	Project and Contracting Office
SDC	Iraqi Southern Distribution Company
SIGIR	Special Inspector General for Iraq Reconstruction
SoW	Statement of Work
TO	Task Order
USACE	United States Army Corps of Engineers

Appendix C. Report Distribution

Department of State

Secretary of State
    Senior Advisor to the Secretary and Coordinator for Iraq
U.S. Ambassador to Iraq
    Director, Iraq Reconstruction Management Office
Inspector General, Department of State

Department of Defense

Secretary of Defense
Deputy Secretary of Defense
    Director, Defense Reconstruction Support Office
Under Secretary of Defense (Comptroller)/Chief Financial Officer
    Deputy Chief Financial Officer
    Deputy Comptroller (Program/Budget)
Inspector General, Department of Defense

Department of the Army

Assistant Secretary of the Army for Acquisition, Logistics, and Technology
    Principal Deputy to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology
    Deputy Assistant Secretary of the Army (Policy and Procurement)
Assistant Secretary of the Army for Financial Management and Comptroller
Chief of Engineers and Commander, U.S. Army Corps of Engineers
    Commanding General, Gulf Region Division
Auditor General of the Army

U.S. Central Command

Commanding General, Multi-National Force - Iraq
    Commanding General, Joint Contracting Command – Iraq/Afghanistan
    Commanding General, Multi-National Corps – Iraq
    Commanding General, Multi-National Security Transition Command – Iraq
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Other Defense Organizations

Director, Defense Contract Audit Agency

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Comptroller General of the United States
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Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

U.S. Senate

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- Subcommittee on Defense
- Subcommittee on State, Foreign Operations and Related Programs

Senate Committee on Armed Services
Senate Committee on Foreign Relations
- Subcommittee on International Operations and Terrorism
- Subcommittee on Near Eastern and South Asian Affairs

Senate Committee on Homeland Security and Governmental Affairs
- Subcommittee on Federal Financial Management, Government Information and International Security
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U.S. House of Representatives

House Committee on Appropriations
- Subcommittee on Defense
- Subcommittee on Foreign Operations, Export Financing and Related Programs
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House Committee on Armed Services
House Committee on Government Reform
- Subcommittee on Management, Finance and Accountability
- Subcommittee on National Security, Emerging Threats and International Relations

House Committee on International Relations
- Subcommittee on Middle East and Central Asia

Appendix D. Project Assessment Team Members

The Office of the Assistant Inspector General for Inspections, Office of the Special Inspector General for Iraq Reconstruction, prepared this report. The principal staff members who contributed to the report were:

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